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ALLEGHENY COUNTY HEALTH DEPT  
AIR QUALITY PROGRAM

## On-going Action Plan for Improvement of Clairton Works' Pushing Emissions Compliance

Clairton Works has taken actions to improve pushing and travel compliance on B and 19-20 batteries. We have made changes to the heating and patching organizations to better manage the maintenance of the battery heating systems. Temporary repairs have been made to the B Battery pushing emissions shed to minimize the escape of pushing emissions until the shed can undergo a re-sheeting rehabilitation in August 1999. The following is a summary of some of the more important efforts to reduce pushing emissions on these units, as a result of the concern voiced at our quarterly meetings by the ACHD.

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### 1. Patcher Scheduling Changes

Some members of our patching forces have been assigned to the back turns to reduce the delays in completing patching repairs to oven areas identified by the heaters as showing evidence of leakage. Only ovens with a hole in the oven wall are banked around to the SX4 shift for refractory repairs. Such ovens require more extensive attention to remove debris from the flue before patching the refractory damage.

### 2. Battery Inspection and Setting

The heaters on each battery unit take oven crosswall temperatures on a scheduled basis, and then take action to correct measured deviations from the normal crosswall temperature curve. Every six months, battery air and gas settings are checked on every wall of the battery. Air

box settings, finger bar adjustments, and gas piping configurations are checked to ensure proper uniformity of combustion from one end of the battery to the other. At this time additional temperatures are taken to ensure uniformity across the battery.

### **3. Oven End-Flue Improvements**

#### **A. Deeper-Wider Door Plugs**

Oven end flue problems have been identified as responsible for a significant percentage of pushing and stack emissions. Clairton Works instituted a program some time ago to install deeper and wider door plugs on 3-1/2-meter and 4-meter ovens across the plant. At this point in time 1-3, 19-20, and 13-15 batteries have been completed, all ahead of schedule, and 7-9 is over half done, and will finish well ahead of the December 31, 1999 target. This extensive program has significantly reduced the emissions from the oven ends.

#### **B. End Flue Temperatures**

Additional end-flue temperatures are now being taken by the Heating Department. This information is given to the heaters for corrective action where necessary. Their progress is being closely monitored by the line heater foreman.

Increased emphasis has been placed on daily preventive maintenance. All Heaters have been instructed on the importance of daily planned maintenance aimed at reducing pushing emissions. The additional heating manager has given all managers more time to monitor progress.

### **4. Coal-Related Gas Adjustments**

In December 1998 the Clairton Heating Department began using a computer program to predict required gas volume changes, based on measured coal parameters such as moisture. Adjustments are made in a feed-forward manner to produce desired coke quality while minimizing pushing emissions. Clairton Works is working on refining this software program, so that gas changes can be made before pushing emissions occur.

### **5. Revisions to B Battery**

#### **A. Individual Wall Orifices**

A check of orifice diameter was made of gas metering offices in the individual wall gas riser pipes on B Battery. It was discovered that the orifices in walls B1 through B19 were slightly larger diameter than design. The correct size was installed, improving wall-to-wall temperature uniformity, and individual flue gas/air ratios.

#### **B. First Flue Air Port Debris Removal**

During 1998, and continuing in 1999, access holes were cut into the base of end flue chambers on B Battery so that excess debris could be removed from the first flue air ports. The first flue air port sliding bricks were removed so that the clean-out could be

accomplished. After the debris was removed, new sliding brick were installed where needed, and the access holes rebricked. This process improved first flue combustion for better heat transfer to the coal charge, and reduced pushing emissions.

#### C. Askania Control Improvements

In September 1998, underfiring gas pressure fluctuations on B Battery were reduced by replacing the Askania controller diaphragm and springs. This change provides more accurate control of the underfiring gas pressure and volume.

#### D. B Baghouse Improvements

A mechanical inspection of all baghouse modules is being conducted and repairs are being made as necessary. Also, a bag inspection is in progress. Leaking bags being replaced as they are identified.

We are currently modifying the pulsing sequence to improve module performance. A new, higher capacity cleaning air compressor has been installed. A design change has been made to #14 baghouse module, utilizing larger diameter pulse holes. Initial data indicates this change will improve differential pressure across the bags by 3 to 4 inches of water. Baghouse bags are continuing to be cleaned manually when necessary to maintain baghouse performance.

#### E. PEC Shed Planned Improvements

B battery has shown a slight deterioration in pushing compliance over the last two years (See Attachment D). A \$2 Million+ rehabilitation of the Pushing Emissions Control shed is scheduled for August of 1999. In the last year, \$77,500 has been spent with outside contractors, performing temporary shed repairs, and filling cracks in the shed roof. We will continue this effort through August 1999, when permanent repairs will be made. The major rehabilitation of the pushing emissions control shed, scheduled for August 1999, should help Clairton achieve significant pushing compliance improvements after that work is completed.

### 6. Revisions to 19-20 Batteries

#### A. Flushing Pressure Adjustment

In February 1999, investigation revealed that some splash-back of flushing liquor was occurring in the new cast goosenecks on 19 and 20 batteries. The goosenecks had been redesigned some time ago, changing from fabricated steel units to cast iron units, in an effort to reduce gooseneck emissions and extend useful gooseneck life. The redesigned units appear to have a slightly higher probability of allowing minor splash-back of flushing liquor, which occurs when some of the flushing liquor runs down the oven standpipe into the oven. In severe cases, this causes "flooded" ovens. But if the splash-back is minor, it causes a slight increase in pushing emissions. In February 1999, the flushing pressure on 19-20 was reduced from 18 PSIG to 12 PSIG. This resulted in a slightly narrower spray cone, and reduced the

possibility of liquor splash-back. Push & Travel compliance have been greater than 90%, based on daily Chester observations since the pressure adjustment was made.

#### **B. Venturi Pipe Supplier**

19-20 batteries are of the Koppers-Becker design, which is a relatively complicated heating wall design. Part of the design involves venturi pipes to recirculate low-O<sub>2</sub> waste gas to dilute the rich underfiring gas and elongate the heating flame. Clairton's sole-supplier of these venturi tubes had a plant fire and went out of business in February 1998. Since that time, Clairton has been using up available spares, and supplementing with spare units purchased from LTV Hazelwood, while searching for a new supplier. During the effort to develop a new supplier, some design changes were made to the venturi tube to increase the amount of waste gas recirculated. Initial data indicate that this design change will have a positive impact on the heating flues, helping to reduce pushing emissions. Several units are currently being tested. The main concern is that the units may transfer too much heat to the upper wall, contributing to tunnelhead carbon formation. If the tests prove successful, however, the new design will be used exclusively on future replacements. There are 2 X 87 X 28 = 4,872 ventures on 19-20 batteries, so it will be many years before all ventures are changed over to the new design, but we plan to install the new design on problem walls, where there is an indication that pushing emissions could be reduced.

#### **C. First Flue Air Port Debris Removal**

Similar to B battery, during 1998, and continuing in 1999, access holes were cut into the base of end flue chambers on 19 and 20 Batteries so that excess debris could be removed from the first flue air ports. After the debris was removed, the access holes were rebricked. This process improved first flue combustion on 16 different walls on 19-20, for better heat transfer to the coal charge, and reduced pushing emissions.

#### **D. Askania Control Improvements**

Underfiring gas pressure fluctuations on 20 battery were reduced by replacing the Askania controller springs. This change provides more accurate control of the underfiring gas pressure and volume.

#### **E. Flue Temperatures**

In recent months, additional flue temperatures have been taken across 19 and 20 batteries in an effort to identify problem flues that require extra work. This effort has concentrated on repeater emissions ovens, to reduce the frequency of SIP violations.

#### **F. Pushing Emissions Control Maintenance**

Crowned rollers have been installed on the 19-20 hood car to improve belt tracking. The roller shims can be adjusted to move the belt in the desired direction to keep the belt straight and in place on the duct.

No. 2 Baghouse (19-20) will be re-bagged in April 1999.

All rotary air locks will be changed on No. 2 Baghouse in 1999.

A Preventive Maintenance Program is being developed for Door Machine Hydraulic systems, to provide more successful PEC duct hook-ups.

#### **G. Recirculating Duct Drilling**

The internal ducts which tie groups of four flues, for recirculation of waste gas on 19-20 batteries occasionally get plugged with debris or patching materials. This duct is very difficult to clean due to its location under the oven regenerators. In December 1998, a new tool was designed by the Heating Department that uses an air-driven, rotating head to clean out debris. This tool is still being modified to perform the job more effectively, but the tool is the best means found to date to open the recirculation ducts. An open recirculating duct allows for flame elongation and proper heat distribution as discussed above in the "venturi" section.

#### **Commitment**

Clairton Works is committed to strive for further improvements to our pushing compliance, so that we will not be a continuing concern to the Allegheny County Health Department. Continuous Improvement To Environment is an ongoing theme of our operation, and we have set objectives for improvements in Pushing and Travel emissions across the plant, but especially on B, 19, and 20 Batteries. We are confident that the observations taken in the future by the ACHD will verify this improvement.

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